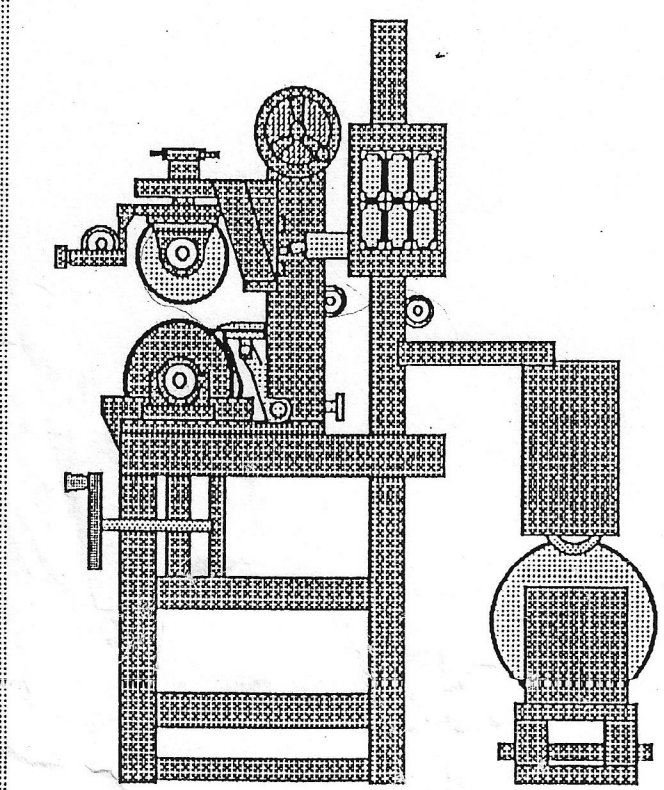
DRI PRINT
COATING OPERATORS
GRAVURE TRAINING MANUAL



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COATING MACHINES

1.00 The schedule of products to manufacture on each machine is obtained by the Machine Operator from the PRODUCTION SCHEDULE or the NIGHT SHIFT SCHEDULE located in the Q.C. room.

1.01 The Machine Operators BPCS Shop Order Routing is distributed to the Routing Box by the shift supervisor.

1.02 The Operator obtain the Routing from the Routing Box located outside the Q.C. room.

1.03 The Operator sets up the machine and checks that all settings and conditions match those on the Routing Sheet. Any deviation must be recorded on the Routing and authorized by the supervisors signature.

1.04 The Operator insures that all electrical switches are turned on.

1.05 The heaters are started and the correct settings are made. If the heaters do not start, turn off gas and notify your Supervisor.

1.06 The Operator collects the film from the appropriate staging area .

1.07 The Operator collects the appropriate mixes from the Mix Staging Area. If the mix is not in the staging área or by the machine, the supervisor should be notified immediately.

•• Goggles must be worn when handling or working near mix. ••

1.08 The Operator loads the base onto the let off.

1.09 The Operator runs a small sample to test the product. When the sample patch is ready it is taken to the Q.C. room by the operator for evaluation.

1.10 If the sample is approved, Quality Control records the required information in the Q.C. LOG and issues a lot number.

1.1A If the sample is not approved, the Operator makes necessary adjustments are made to the running conditions , mixes or base and another patch is made.

1.11B The Operator or Q.C. Technician advises the Shift Supervisor of the changes . If after adjustments the patch is still not acceptable, the Supervision notifies the Production Scheduler for possible rescheduling .

1.12 If the production run can not continue due to reformation needs, the Lab is notified of a Production Problem Job.

1.13 The Operator cuts out film patches at predetermined times for Q.C. checks

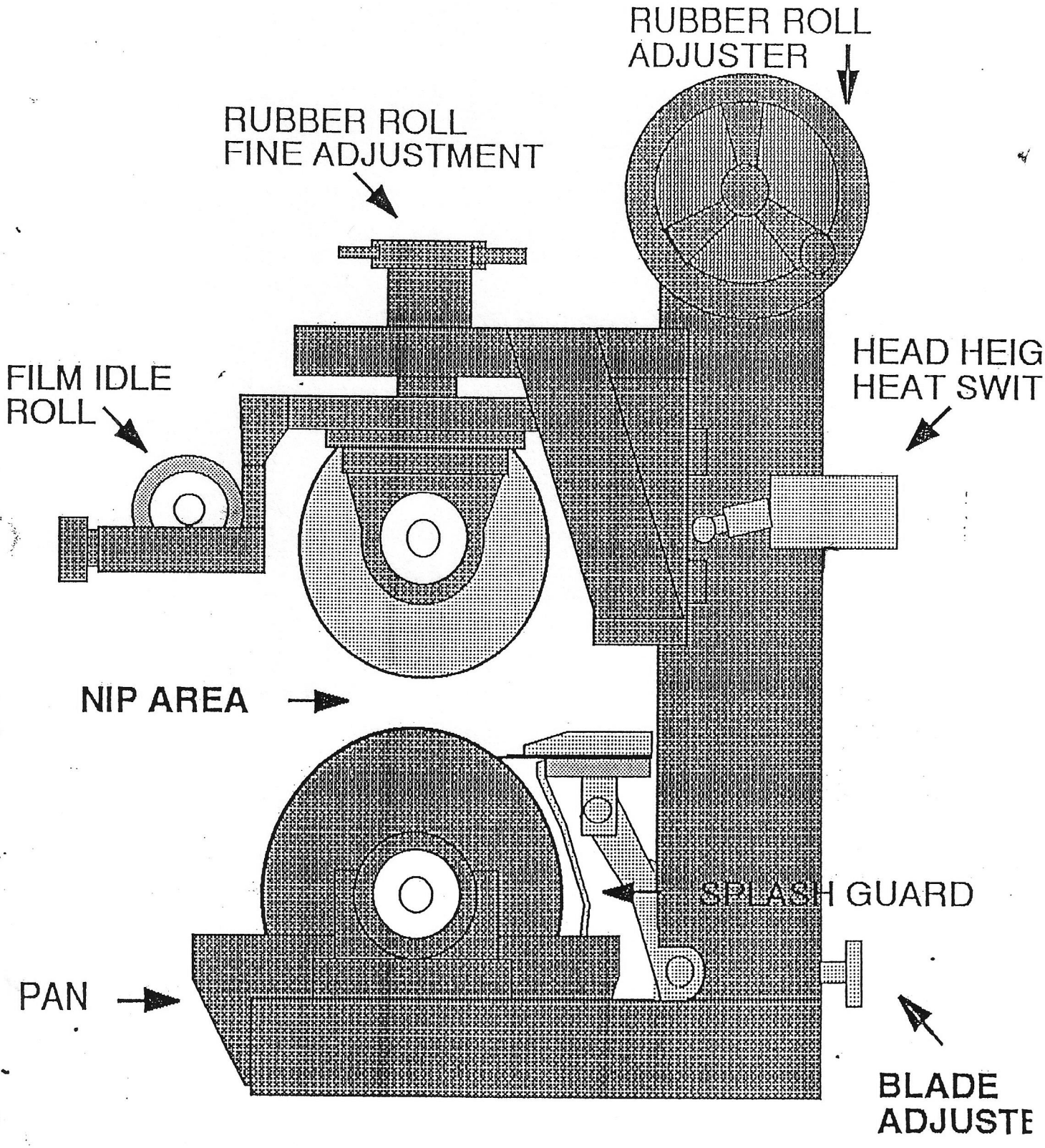
1.14 The Operator records all information needed on the routing sheets. (e.g. Mix consumed, lot # , footage, start stop times , etc...)

1.15 The Operator records all needed information on the BLUE PRODUCTION RECORD CARD.and the ORANGE PRODUCTION RECORD CARD that stay with the roll of film for the rest of the film production .

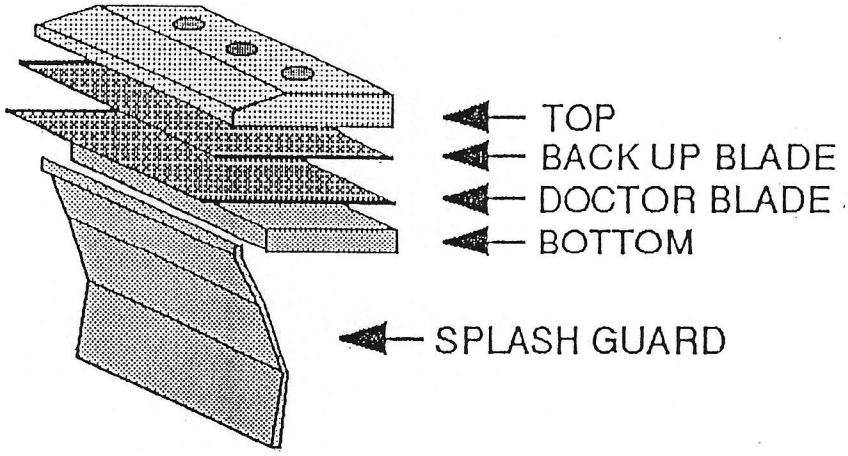
1.16 The Operator verbally reports Job Number , Footage and major problems to the Shift Supervisor before the end of the shift.

1.17 The Operator punches his TIME CARD at the beginning and end of his work day and out and in for lunch.

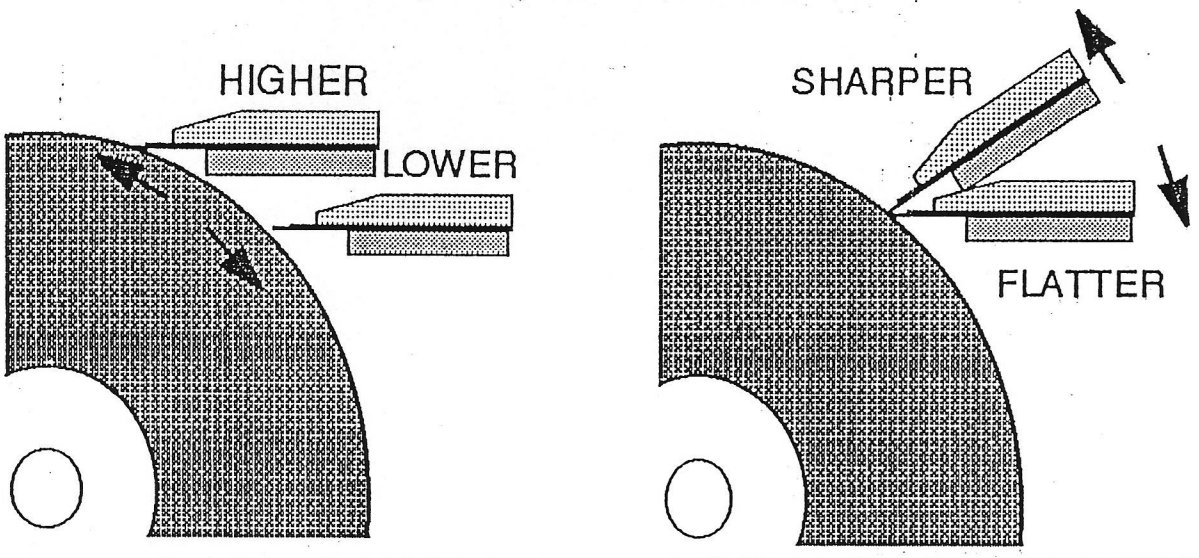
GRAVURE COATING HEAD



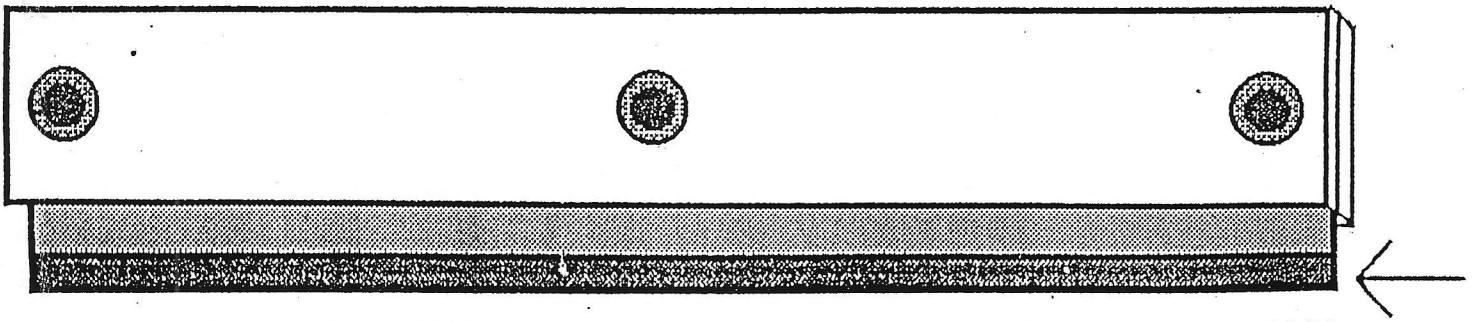
DOCTOR BLADE HOLDER PARTS



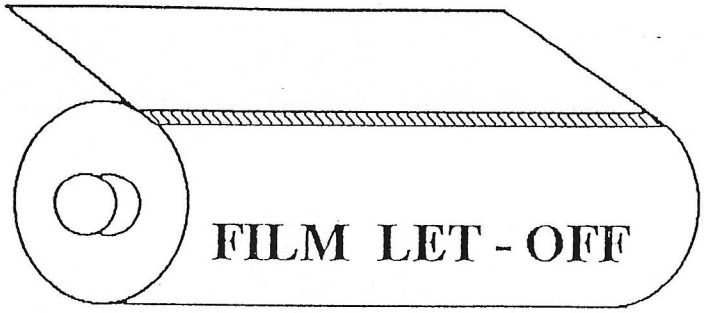
DOCTOR BLADE TERMS USED



FOR ALL COATING MACHINE BLADE HOLDERS



1/4 " OF BLADE EDGE EXTENDING PAST BACK-UP BLADE



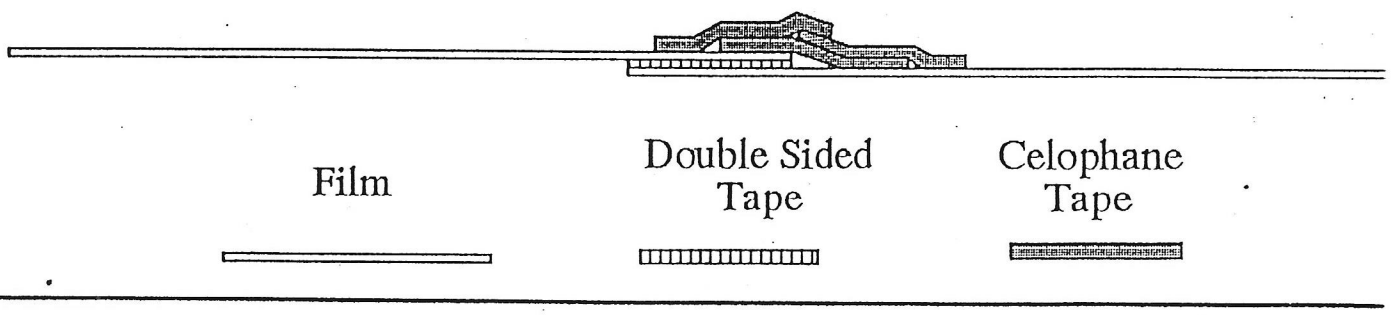
FILM LET - OFF

All of Dri Prints products are printed on thin gauge film, either Polyester or Polypropylene A new roll of polyester can weight several hundred pounds and is lifted with a sling. The film needs care when its being loaded on to the Let- Off. If the film is bumped against anything during loading, it may be cut. A small cut in the roll of film can cause hundred feet of waste .

The correct way to splice a new roll of film to film already strung through the machine is as follows:

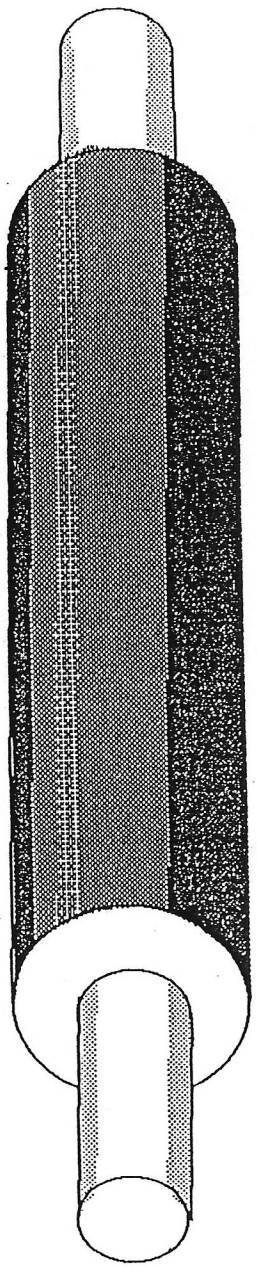
With the new roll positioned on the Let Off , tape a length of the double sided tape across the roll. Make sure the tape sticks out on both sides of the roll. Press down on the tape to make sure its stuck well. Slice off any extra film the extends past the tape. Peel the backing off the double sided tape. Hold the other film over the tape and make sure it lines up with the edges. Bring the film down onto the tape holding both sides evenly. When the films are stuck together , press down on the film and wipe any bubbles out. Lift the extra length of film up and with a razor carefully slice any film the goes past the tape. Using clear cellophane tape , tape the seam where the old film butts against the new film, Then tape the cello. tape to the new film . Then tape the tape to the old film. (See Illustration) Use the razor to cut the excess off both sides. Press on the taped splice and make sure its solidly attached.

SPLICE DIAGRAM



CYLINDERS

The printing of foil is done by transferring mix from the pan to the film or web. The most common method at Dri Print is with a Gravure cylinder. This is a cylinder that is covered with small holes, cups or cells that pick up the ink from the pan andtransfer it to the film. A cylinders name refers to the number of cells per linear inch and the shape of those cells. For example, a 200Q cylinder has 200 cells per inch and the cells are Quadrangle (square) shaped. The cylinder may also be a pattern roller which uses the same cells but they are arranged to print a pattern or design.



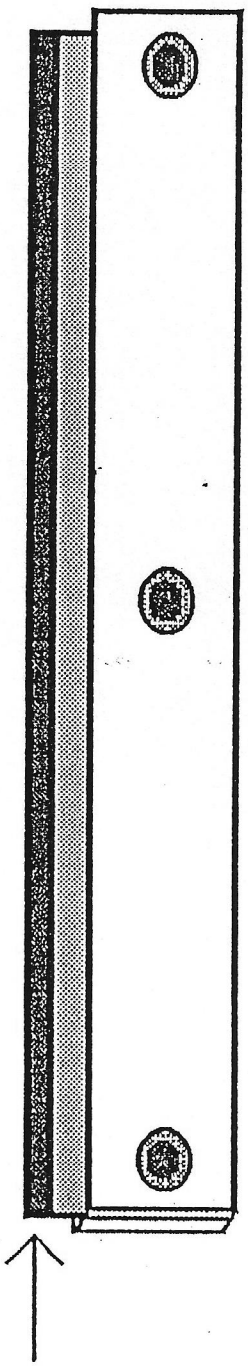
Every job should start with a clean cylinder. Dried ink or water spots cause misses , marks or pin-holes in the print. Solvent will clean ink from the roll and brushing with a cleaning brush should remove all stains. If there are stains or spots in the cylinder that can not be removed notify your supervisor. He will determine if the printing cylinder needs to be replaced.

At the end of every job the operator should wipe down the cylinder with rags, wet the cylinder with solvent, raise the blade and wipe off the excess ink again. When this is done, the cylinder should be clean and not have noticeable stains or color streaks. If after a through clean down the roll is still not clean, notify your supervisor. He will make a determination on whether the cylinder should be removed and replaced with a cleaned one.

Running jobs with dirty or stained rolls produces defects and is an avoidable cause of waste. Using the wrong screen or cylinder type will also cause defects. The coating operator is responsible for insuring that he is not running waste

The printing rolls are hard and strong but they can be dented or damaged. Never bang metal objects like the pan or cans against them. At the end of a job or shift the cylinder should be cleaned and covered with the cardboard cover to prevent damage. With care and attention these rollers can produce the quality product that Dri Print is known for.

BLADES



Excess ink that is wiped off the printing cylinder by a "Doctor" Blade. This is a sharpened piece of steel about three inches wide and a little longer then the printing cylinder. It comes in contact with the cylinder in the back of the coating head. Care must be taken at all times with Doctor blades. They act just like a razor blade as far as your hands are concerned. The blades wiping action is used to control the amount of ink printed. If the blade is worn, scratched or improperly aligned it will cause defects.

The best way to avoid problems with a doctor blade is to inspect it at the beginning of the job run. Examine the blade to assure it is not coated with dried mix and that it is not worn, damaged or cracked. A thin line showing in the coating is usually caused by a nick in the blade or dried mix caught behind the blade. The dried mix should be removed by lifting the printing head, slowing the cylinder speed, and raising the blade. A wiper or sandpaper rubbed on the area of dried mix should remove the mix from the blade.

The costs of the doctor blades is insignificant compared to the cost of running waste. If there is any problem and a light sanding of the blade does not solve the problem, the blade should be changed immediately. The blade should be changed at least once a week. When changing the blade make sure the blade is inserted firmly into the holder and not extended too far out. The proper width of blade showing is 1/4" out past the back up blade. Too much flex from pressure or blade thickness causes improperr wiping.

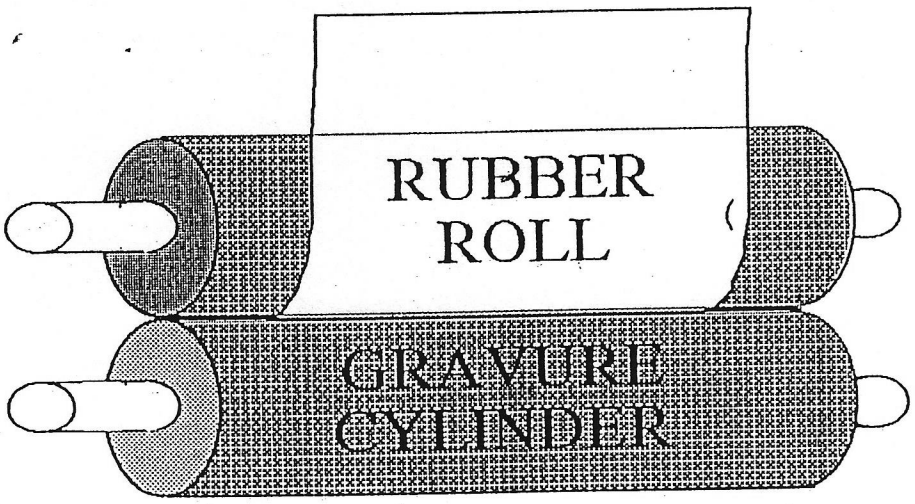
Inspecting, cleaning and adjusting the blade at the start of the job is the best way to assure a completely good run.

RUBBER ROLL

The Rubber Roll or "Impression Roll" is used to apply pressure to the web or film to enable the gravure cylinder to print the inks.

The rubber roll should be clean and free of dried mix. The roll should also be the proper width to print the approved size. The best approach to using these rolls is to clean them at the start of each run, check them during the run and keep them powered with talc after each cleaning.

The size of the print is determined by the size of the rubber roll face. A good rubber roll will have an even edge and be 1/8 to 1/4 inch shorter the the web being printed. Ink that overlaps the film and prints on the rubber will cause spots and defects.



To change print size, the rubber roll must be changed. After the roll has been installed, the operator should adjust the coating head to the new height of the rubber.

This procedure is done with the machine not running:

Start the adjustment with the rubber roll in the with the air cylinders in the down position but the adjusting screws up so the is no contact with the printing cylinder. Bring the rubber roll down with the head adjustment screws until it is just touching the printing cylinder. When the weight of the rubber is evenly supported across the print cylinder set the coating head air cylinders up. The rubber should now be set properly. After the machine is patching you may have to adjust the pressure lightly to avoid misses. If the pressure of the printing roll is too heavy it will wrinkle and cause the film to pick off

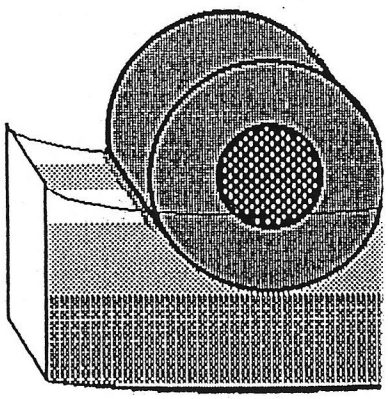
PANS

The pan holds the ink that prints onto the film. It is located inside the printing head where it wets the printing cylinder.

The level of mix in the pan is very important to proper mix flow and printing quality. A low ink level will cause the mix to dry on the printing cylinder and cause misses in the print. A high level will cause the mix to over run the sides.

Before starting a new job the pan should be lined with plastic to ease cleaning. At the end of the job the plastic should be removed and the pan wiped clean with solvent. Make certain that the pan holes that return the mix to the drums are open and the mix flows through them freely.

A splash guard is located at the back of the pan this keeps the ink from spilling onto the film or out of the pan. This should be free of dried mix and not rub against the printing roller .

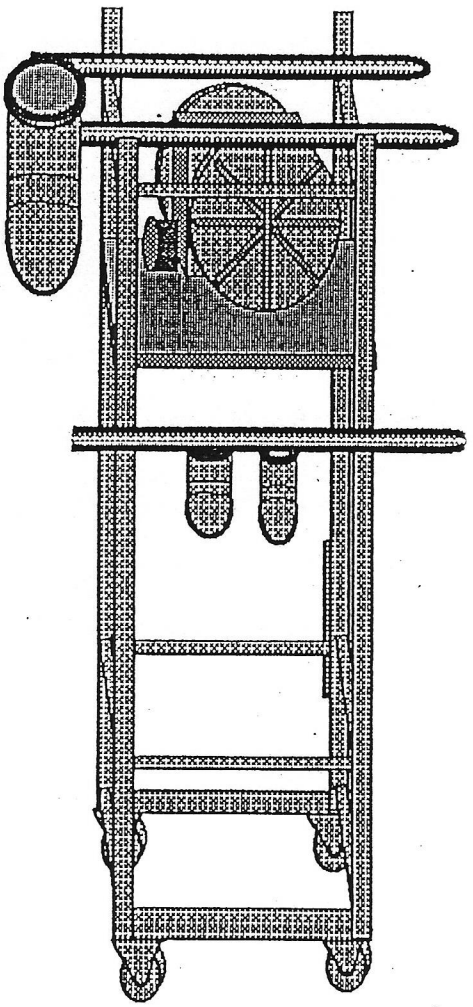


The ink travels into the pan through hoses with a copper tube at the end. The tube is made of soft copper to avoid damaging the printing cylinder. When installing the hoses into the pan make sure the hose hooks hold the hoses securely in place. A loose hose can splash mix or fall out of the pan causing a spill.

The hose that carry the ink can become dirty and coause printing problems. These hoses should be changed at least once every two weeks or sooner. When a dark job is run the hoses should be changed before the next light color ink.

PUMPS

Every coating head has its own pump. The pump delivers ink or mix to the coating head pan. It is located near the printing head . Hoses connect the pump to the pan and a metal pipe from the pump is immersed into the mix drum. A grounding wire connects the drum to the pump, and another grounding wire connects the pump to the machine.



Notify your supervisor if your pump leaks or freezes up. When pumps need maintenance they should be placed in the "PUMP REPAIR AREA" near the maintenance room by the coating operator .If another pump is needed it should be taken from the "REPAIRED PUMPS" area. Repaired pumps are placed in the "REPAIRED PUMPS" area by the maint. men.

Changing the filter and running clear solvent through the pump at clean down time will remove the contaminants and assure the pump will start freely for the next job.

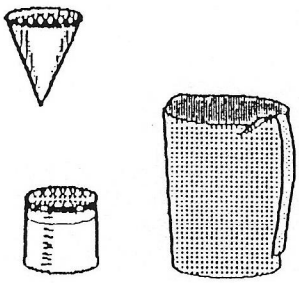
Dark mix particles left from a previous job will change the color of a light mix. Some jobs require a special pump marked "CLEAR PUMP" or one marked "WHITE ONLY". These pumps are separated from the regular pumps and should only be used for its designated jobs. When the CLEAN JOB is completed the pumps need to be flushed at least twice until the solvent running out of the hoses is clear. The hoses may need to be replaced. The filter in the pump should always be replaced after a clean job.

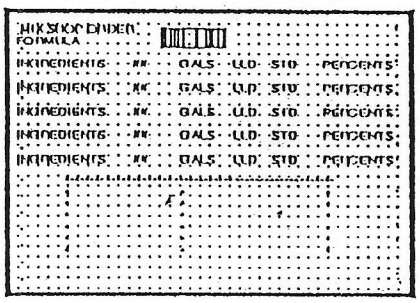
If flushing does not clean the pump, notify your supervisor before shutting down so the mix will not harden inside the pump.

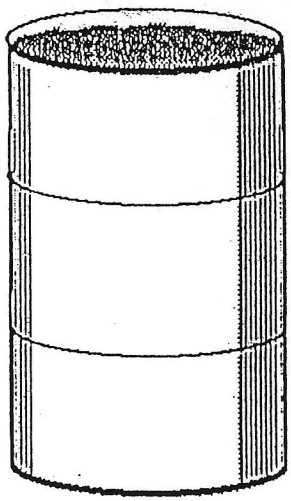
The "PUMP REPAIR AREA" is not for pumps that have frozen up due to improper cleaning. These pumps should be soaked with solvent by the operator to free the pumping mechanism.

Pumping mix too fast will cause bubbles -which show in the print as spots, flow marks or voids. Too slow a pump will allow the ink to settle in the pan and may cause color changes.

DRUMS







In the Production Area , the inks are normally stored and pumped in 55 or 30 Gallon drums. The drum has two clear pouches attached to the sides .

One pouch contains the Right To Know information. This information tells of the contents and its ingredients. The information can be used to determine if there is a hazard associated with the inks.

The other pouch contains the B.P.C.S. Mix Formulation Shop Packet or Formula. The formula has a list of the ingreidents, with the actual amount used during the mix making.

When adds are made during production the mix Formula changes need to be writen on the B.P.C.S. Formula and then initialed by the Supervisor or Q.C. person authorizing the adds.

When an ad is made its important that the add materials used are good. The mills used in our process settle out if left in storage for severalhours. If a mill is being added, it must be kicked-up first to assure that the powders are dispersed evenly.

The same kicking-up must be done to any dispersion that has been in storage for a shift or more. The solvents can separate and if the add is just scooped off the top, the color concentration may not be correct.

TENSION

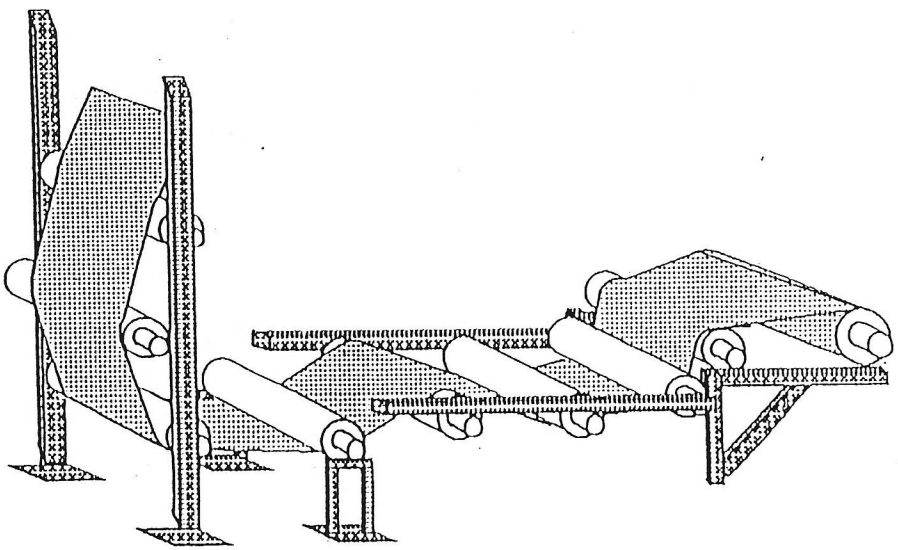
After the film is coated by the ink and dried by the tunnel heaters it comes out of the Coating machine, is cooled down by air or by cooling rolls, and is wound onto a core.

The tension settings on the machine are extremely important to the finished product :

Set too high and the roll will stretch and the printed film may come off.
A tight roll will also shrink in width.

Set too low and the roll will be baggy.
This will cause wrinkles and creases.
It can also cause the film to "telescope" or unwind laterally, which may destroy the entire roll of foil.

When removing the roll from the Take-up, be sure to avoid damage to the roll from contact with the machine. If the roll is dropped or banged onto the floor a great deal of waste can be caused by the core being smashed. Care should also be taken when removing the rolls from the sling. Never place the rolls on dirt or spills on the floor.
Rolls that are finished product should be placed inside a plastic bag to avoid dirt and humidity causing waste to the product.



FILM TAKE - UP

The finished roll of film is the Coating Departments real product. A coater will slit the web to certain dimensions at the take up (or re-wind). The width of the cuts is extremely important to saleability.

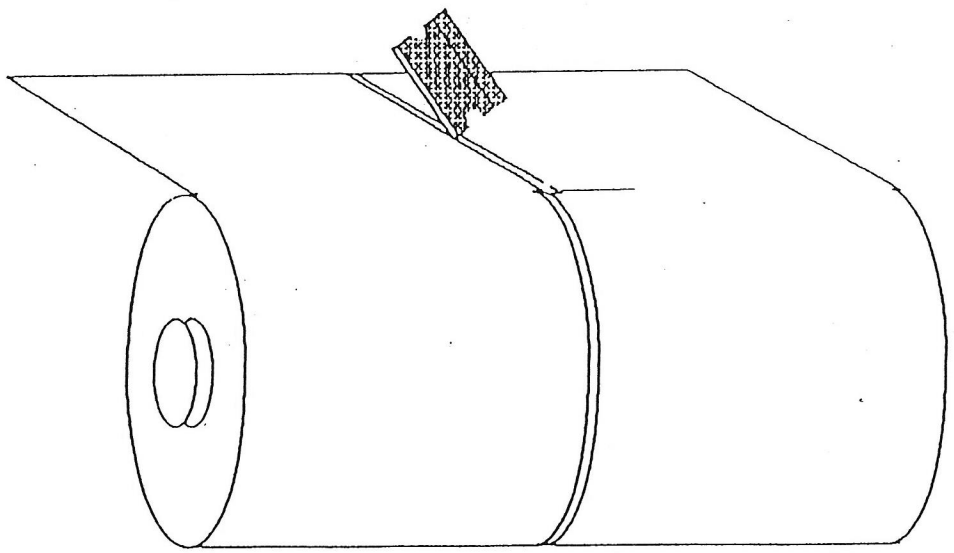
On a normal job that is split into two equal rolls the measurements should be made with an equal amount of boarder on both sides . When a job calls for special cuts (e.g. 15" and 35") the sizes are chosen to produce the most effective cuts for our customer. The size needed is measured in terms of sized materials. In other words, a 15" cut that only has 14 1/4" of sizing because of a large border is not saleable.

Due to the shrinkage of the web you should not measure where the blade will cut until after the web has been heated by the tunnel to the running temperature. The web guide must be steady to accurately set the blade.

To avoid breakage of the taped splices the splice should never be left inside the tunnel. The heat may weaken the tape or the machinetension, on start up, will pull the splice apart.

To avoid a tunnel full of dirt and particles , a printed leaf should not be left inside the tunnel . When the leaf dries it will flake and cause dust. This is especially true of Pigment jobs and heavy sizings.

A saftey hazard of the coating Take-up is the blade itself. When ever the blade is not being used to slit film, it should be placed in the upright posistion and covered with a small length of rubber hose. This will stop any possible danger from cuts.



COATING APPEARANCE

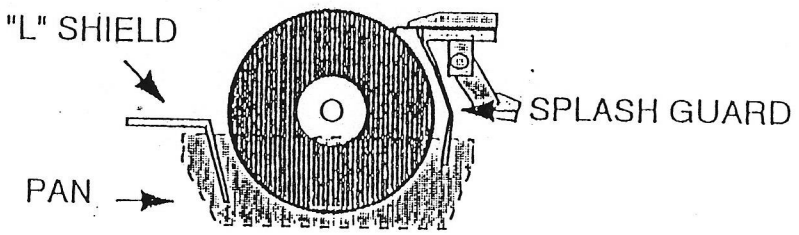
The Coating Operator is ultimately responsible for the final performance of our film. The customer requires consistent quality color, appearance and stamping properties.

Care and attention to the ink while running a job will eliminate the most common problems.

- **PIGMENT MARKS** which are spots of ink , either lighter or darker , than the running ink. Straining the mix will help remove them. Starting with a clean machine will usually stop these before they start.

- **BUBBLES** may actually be bubbles or may be unmixed plastic resin. Straining through the filter and lowering the pumping flow will help eliminate this. Change the filter if pump pressure backs up due to clogging.

- **FLOW MARKS** are from the mix improperly mixing in the pan . This may be too fast a pumping speed or the hoses may be set up wrong. Place cardboard shields on the ends of the pan where the mix enters to prevent a wave from forming. The wave in the ink causes flow marks. A "L" shaped shield of aluminum placed in front of the pan near the printing cylinder will also slow down flow marks.



- **ORANGE PEEL** gives the film look of the peel of an orange . A coarse textured or "pimply" top coating can be seen. This can be caused by having too thick a coating or the wrong viscosity. Check the viscosity in the drum and check that the proper screen cylinder is being used.

· FILMY PRINT shows when the stamped foil doesn't break clean from the stamping die. The cause can be a coating that is not completely dry or a coating that has too high a plasticizer content. Check the mix viscosity and the stamping die temperature

· BLUSH is a cloudy look to the coating of a clear color coat . This is undesirable in most cases. For a color coat the causes may be the wrong solvent or water in the mix, a bad mix batch or too high a temperature in the tunnel.

On a sizing the blush gives a white and flat look to the coating which is desirable for most jobs. .

· STATIC MARKS may look similar to a number of other problems. These marks are caused by static electricity in the mix or on the rubber roll. The copper "tinsel" static eliminators may need to be positioned on the leaf differently to remove the marks. The addition of ASA to the mix will also help remove these. All adds to the mix must be OK'd by Q.C.

· PIN HOLES are small holes in the coating. They may be caused by dirt on the rollers, rubber rollers, or dried mix on the GRAVURE cylinder. They also can be caused by spots from the plating process or a problem with the layers of the base coatings. The viscosity and heat should be checked and the rollers should be clean.

· HEAT MARKS are lines or creases in the polyester base causedd by too high a heat in the tunnel or too slow a speed. If the film rests against hot tunnel rolls it can also crease.

MISSES: Can be caused by dirt on the rubber roll. If the nip (the spot where the rubber roll and the printing roll come together) is mis-alinged the film will come through the head with misses. Check for gaps . If the pressure from the roll adjustments is uneven a gap ca also occure.

LINES AND WRINKLES: Mis-alignment of the carrier rollers or Tension problems are the cause o wrinkles. Often the problem can be cured by head adjustment and alligning the Idle roll after the Nip i the coating head. Sometimes the problem can be a bearing in the tunnel that needs lubrication . A piec of tape or dirt on the tunnel rolls can also cause lines or wrinkles. The problem may need investigatio to solve. Waste caused by wrinkles should be minimised by stopping the machineto investigate th causes if thay dont go away easily.